PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to the Manufacture of Mouthpiece Cigarettes

We, RONALD ARTHUR FRAZER, a British Subject, and THE MOLINS ORGANISATION LIMITED (formerly known as Molins Machine Company Limited), a British Company, both of 2, Evelyn Street, Deptford, London, S.E.8, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns improvements in or relating to the manufacture of mouthpiece cigarettes, and in particular to a method of and apparatus for making mouthpiece cigarettes by uniting cigarette lengths and mouthpiece portions by means of encircling uniting bands.

A mouthpiece portion may consist of a length of filtering material, or a hollow tube, or a length of any other material suitable for incorporation in the mouthpiece portion of a mouthpiece cigarette, or any combination of the foregoing. For convenience, such mouthpiece portions will be referred to herein as "stubs", and it is to be understood that the expression "stub" includes a mouthpiece portion whose length is a multiple of that suitable for incorporation in an individual mouthpiece cigarette. The expression "double-length stub" shall be understood as meaning a stub whose length is double that required in an individual mouthpiece cigarettes.

The expression "mouthpiece cigarette" where used herein shall be understood as meaning a cigarette consisting of a cigarette length, that is a length of wrapped cigarette rod, and a stub, arranged end to end and united by an encircling uniting band.

It has been proposed, in the manufacture of mouthpiece cigarettes, to move groups of components, each group consisting of a double-length stub arranged between and in endwise abutment and axial alignment with two cigarette lengths, sideways through a passage formed between a moving surface, on which the groups are supported, and an opposed stationary surface, so that each group travels sideways through the passage in the direction of movement of the said moving surface, and is caused to roll rearwardly over the said moving surface (as considered in the direction of movement of the latter), uniting bands being introduced into the passage so that a uniting band is wrapped around each group to unite the components as the group is rolled. It has also been proposed to move such groups sideways along a stationary surface, on which the groups are supported, and into a passage formed between the said stationary surface and an opposed moving surface, so that the groups are caused to roll forwardly (as considered in the direction of movement of the said moving surface) over the stationary surface, uniting bands again being introduced into the passage to be wrapped around the groups as they roll.

It will be appreciated that, in such arrangements where a rolling passage is formed between one stationary and one moving surface, the rate of sideways movement of a group is directly dependent upon the rate at which the group is rolled. Thus, when a relatively fast sideways movement is required, the rolling action will also be fast.

According to the present invention there is provided a method of making mouthpiece cigarettes, comprising the steps of moving a group of components, including a stub and at least one cigarette length, arranged end to end in axial alignment, sideways through a passage formed between two opposed surfaces arranged to move in the same direction at different speeds, so that the group is moved sideways through the passage in the direction of movement of the said surfaces, and is caused to roll rearwardly relatively to the faster moving of the said surfaces (as considered in the direction of movement of the surfaces)

during such sideways movement, and introducing a uniting band into the said passage so that the said band is wrapped around the group to unite the said components as the group is rolled. By this method a relatively slow rolling action can be imparted to a group whilst it is moved sideways at a high speed, the rate of the rolling action being determined by the difference in the speeds of the said surfaces.

For example, successive groups, each consisting of a double-length stub positioned between and in endwise abutment and axial alignment with two cigarette lengths, may be moved sideways through the said passage, uniting bands being introduced into the passage so that a band is wrapped around each group as the group is rolled, and each united assemblage so formed then being severed through the centre of the double-length stub to produce two mouthpiece cigarettes.

Further according to the present invention there is provided apparatus for making mouthpiece cigarettes, comprising a passage formed between two opposed surfaces arranged to move in the same direction at different speeds, means to feed groups of components, each group including a stub and at least one cigarette length, arranged end to end in axial alignment, to the said passage, so that each group is moved sideways through the passage in the direction of movement of the said surfaces, and is caused to roll rearwardly relatively to the faster moving of the said surfaces (as considered in the direction of movement of the surfaces) during such sideways movement, and means to introduce uniting bands into the said passage in timed relationship with the feed of the said groups so that a band is wrapped around each group to unite the said components as the group is rolled.

The said opposed surfaces may be surfaces of continuously movable, endless elements, such as belts, and the said groups of components may be carried sideways by one of the said elements into the passage, and supported by the said one element as they are move sideways through the passage. Preferably the said one element on which the groups of components are carried through the passage is the slower moving of the two elements, so that each group is rolled forwardly over the said one element (as considered in the direction of movement of the element). There may be provided movable members, such as bars, against which the said components can be aligned in their respective groups on the said one element as they are fed to the said passage. Preferably the said members are arranged to move continuously at a speed substantially equal to the speed at which the groups move sideways through the passage, a member acting to push a group of components into the said passage, to move through the passage behind the said group of components (as considered in the direction of sideways movement of the group) as the latter is rolled, and to push the group of united components from the passage.

The said uniting bands may be severed from a continuous web of suitable material, such as cork, and may be introduced into the said passage by one of the said continuously movable elements. For example, the uniting bands may be fed in succession by the faster moving of the said elements, so that each group of components is rolled rearwardly relatively to the said element (as considered in its direction of movement) and over a uniting band, which adheres to and becomes wrapped around the group.

Apparatus in accordance with the invention will now be described by way of example with reference to the accompanying drawings, in which: —

Figure 1 is a side elevation of apparatus for making mouthpiece cigarettes.
and

Figure 2 is a plan view of part of the apparatus shown in Figure 1.

Referring to Figure 1, a web W of cork is fed from a spool 1 across a tensioning roller 2 and over a guide plate 3 provided with side guides 4, by means of feed rollers 5 and 6 positioned beneath the guide plate 3. The roller 5 is a pressure roller which presses the web W against the driven roller 6. A variable speed drive is transmitted to the roller 6 so that the web W can be fed at different speeds in a manner to be described later.

Beneath the feed rollers 5 and 6 is provided cutting means comprising a rotatable knife 7 having a cutting edge 8, which coacts with a fixed knife 9 having a cutting edge 10, to cut the web W transversely of its length and sever desired lengths therefrom. An arm 11, movable about a pivot 12, is urged by a spring 13 to swing clockwise as viewed in Figure 1 so that its lower end projects over the cutting edge 10 of the knife 9. Movement of the arm 11 is controlled by a cam 14 which is rotatable with the knife 7. As the knife 7 approaches its cutting position, the lower end of the arm 11 is moved to its position shown in Figure 1 under the action of the cam 14, so that the cutting edge 10 is exposed to allow the knives to coact and sever the web. Immediately after the web is severed, the cam 14 allows the arm 11 to move clockwise as viewed in the drawing under the action of the spring 13, so that its lower end projects slightly over the cutting edge 10. By this movement the leading end of the severed web W is guided past the edge 10 by the arm 11, and the movement of the web is not impeded by the edge 10.

Beneath the cutting means is provided a driven hollow suction roller 15 against which two idle rollers 16 and 17 are pressed. The hollow roller 15 is provided with peripheral

suction ports 15*a* which register with a stationary suction chamber 15*b* positioned inside the roller, and connected by a pipe 15*c* to a source of suction (not shown). The rollers 16 and 17 are mounted on a part 18 connected to an arm 19 which is movable about a pivot 20. The arm 19 is urged, by a spring 21 attached to an element 22 connected thereto, to press the rollers 16 and 17 against the driven roller 15.

The movable knife 7 rotates in timed relationship with the feed of the rollers 5 and 6 to sever desired lengths from the web W. Immediately before a cutting operation the roller 6 is accelerated to its maximum speed, which corresponds to the speed of the roller 15. Thus, while the web W is being cut it is firmly gripped above and below the cutting position by being held between the nip of the rollers 5 and 6, and 15 and 16 respectively, the web being fed at the same speed by both pairs of rollers. By this arrangement slewing of the lengths as they are severed from the web can be prevented, and lengths can be cleanly severed from the web when the latter is fed at a relatively high speed. Immediately after the cut is made, the speed of the roller 6 is reduced so that the web W is decelerated and its leading end becomes separated from the trailing end of the severed length, which continues to move at the faster speed between the driven roller 15 and pressure rollers 16 and 17. Successive lengths L severed from the web W thus become spaced apart by a distance determined by the difference between the peripheral speed of the roller 15 and the average rate of feed of the web by the feed rollers 5 and 6.

Lengths L, which are to act as uniting bands, thus severed from the web W, are received successively on a moving, endless air-pervious belt 23 passing about hollow rollers 24 and 25. A stationary suction chamber 26 which is connected by a pipe 27 to a source of suction (not shown), communicates through channels 28 with a suction groove 29 extending along the upper run of the belt 23 between the rollers 24 and 25.

The roller 24 is provided with peripheral suction ports 30 which can register with a stationary suction chamber 31 positioned inside the hollow roller. The chamber 31 communicates through ports 30 with the suction chamber 26. The roller 25 is similarly provided with peripheral suction ports 32 which can register with a stationary suction chamber 33 positioned inside the hollow roller. The chamber 33 is connected by a pipe 34 to a source of suction (not shown).

The roller 24 is driven to move the belt 23 (in the direction of the arrow of rotation shown on the roller 25) at a speed equal to the peripheral speed of the roller 15, so that successive lengths L received thereon retain their spacing as they are carried on the belt. The lengths are suctionally held to the air-pervious belt, by means of suction applied through the ports 31, the groove 29 and the ports 32, and are conveyed by the belt along its upper run and about the roller 25.

Positioned above the upper run of the belt 23 is adhesive-applying means comprising a rotating applying roller 35, arranged to apply adhesive to the upper surface of lengths L carried on the belt 23, and a rotating segmental transfer roller 36, which transfers liquid adhesive from a duct 37 to the periphery of the roller 35. A doctor blade 38 is provided to control the amount of adhesive transferred by the roller 36. The adhesive-applying means operates in timed relationship with the feed of the lengths L so that those portions of the periphery of the roller 35 to which adhesive has been applied register with the lengths L, the peripheral speed of the roller 35 being equal to the linear speed of the belt 23. An arcuate heating surface 39 is provided near the roller 25 so that, as the lengths L are carried on the belt 23 about the roller 25, the adhesive on the outer surface of each length L is activated by heating to render it in a suitable state for adhering to components in a manner to be described later.

If desired the adhesive-applying means described above may be replaced by similar adhesive-applying means positioned to apply adhesive to one side of the web W as it issues from the spool 1. Such adhesive-applying means is shown in broken line in Figure 1, and indicated generally by the reference 40.

As a further alternative, a web W to which adhesive has previously been applied could be used, in which case the adhesive-applying means could be omitted from the apparatus, the heating surface 39 acting as previously described to render the adhesive in a suitable state immediately before the lengths L are required to adhere to components.

Beneath the lower run of the belt 23 there is provided a further movable endless belt 41, which passes about rollers 42 and 43, and whose upper run is parallel to and spaced from the lower run of the belt 23 so that a passage is formed between the surfaces of the two belts. The lower run of the belt 23 is beneath a stationary member 44, which contains the suction chamber 26, and whose lower surface is flat and acts as a fixed guide against which the belt 23 can be pressed. A fixed plate member 45 extends beneath the belt 41 along its upper run, and acts as a support and guide for the belt.

The roller 42 is driven to move the belt 41 (in the direction of the arrow of rotation shown on the roller 43) at a speed less than that of the belt 23, the ratio of the speeds in the present arrangement being 5:7. Thus the lower run of the belt 23 and the upper run of the belt 41 form a passage whose defining surfaces move in the same direction at different speeds.

The upper run of the belt 41 extends rearwardly (as considered in the direction of movement of the belt) beyond the belt 23, and groups of components, each group comprising a double-length stub positioned between two cigarette-lengths, are fed to the belt 41 behind the belt 23 in the following manner:—

Double-length stubs S are carried sideways in grooves 46 of a rotating wheel 47 over a guide plate 48, and transferred to a fluted drum 49. The stubs S fed to the wheel 47 are severed from multiple length stubs in a manner generally similar to that described in British Patent Specification No. 876,732 dated 20th February, 1958 the pusher disc 20 shown in Figure 1 of the provisional drawings of that specification acting to push double-length stubs S into successive grooves 46 of the wheel 47 of the present arrangement. It will be appreciated, however, that double-length stubs S could be fed to the wheel 47 directly from a hopper, if desired.

The drum 49 has longitudinal peripheral flutes 50, of which alternate flutes are each provided with a pair of stops 51 positioned approximately half-way along the flute, the two stops in a pair being separated by a distance slightly greater than the length of the double-length stub S. The wheel 47 is positioned approximately mid-way along the drum 49, and transfers the stubs S to the latter so that a stub is received in every flute 50 provided with a pair of stops 51, the stub being received between the two stops in the flutes. Stubs S are thus received and carried sideways in alternate flutes of the drum 49, which is rotated clockwise as viewed in Figure 1.

Positioned at a level above the fluted drum 49 and adjacent its end (the far end as viewed in Figure 1) is a rotating suction wheel 52 provided with a helical peripheral groove. The wheel 52 is positioned after the cut-off of a continuous rod cigarette-making machine (as considered in the direction of travel of the rod) and acts to accelerate cigarette lengths C severed from the rod, and to move cigarette lengths C axially, over a support 53, into successive flutes 50 of the drum 49. A cigarette length C thus moved into a flute without stops 51 travels along the flute past the stubs S carried in the two adjacent flutes, whilst a cigarette length C which is thus moved into a flute provided with stops 51 has its lengthwise movement arrested by a stop, and therefore comes to rest at a position spaced from the stub S carried in the flute (on the far side of the stub S as viewed in Figure 1). In this manner alternate flutes 50 (those without stops 51) receive and carry single cigarette lengths C, while each of the flutes 50 provided with stops 51 receives and carries a double-length stub S and an endwise spaced cigarette-length C.

The construction and operation of the grooved suction wheel 52 are described in British Patent Specification No. 875,330. It will be appreciated, however, that cigarette lengths C could be fed to the drum 49 from a suitable hopper or hoppers, if desired, instead of being severed and fed directly from the rod of a continuous rod cigarette-making machine as described above.

The general arrangement whereby components are fed to and carried by the fluted drum 49 is described in co-pending British Patent Application No. 24143/59 (Serial No. 958,648), but, in that application, double-length cigarette portions are fed from a hopper to lie approximately centrally in alternate flutes of a fluted drum, and single-length mouthpiece portions are moved axially into successive flutes of a drum, whereas, in the present arrangement, double-length stubs S are fed to lie centrally in alternate flutes, and single cigarette lengths C are moved axially into successive flutes.

The double-length stubs S and the cigarette lengths C are conveyed by the rotating drum 49 over an arcuate guide plate 54, to be delivered to the endless belt 41, the guide plate 54 having an end 55 positioned above the belt 41 over the roller 43. As each flute 50 travels past the end 55 of the guide 54, the component or components carried in the flute fall on to the belt 41, the components delivered from two successive flutes (of which the leading flute carries only a single cigarette length C) forming a group comprising a double-length stub S positioned between two cigarette lengths C, one cigarette length C being ahead (as considered in the direction of movement of the belt 41) of the two other components in the group.

Referring now also to Figure 2, which is a plan view of the belt 41, movable pusher members, in the form of bars 56, extend across the belt 41 at spaced intervals therealong. The bars 56 are carried by members 57 which are connected to a pair of endless chains 58 passing about sprocket wheels 59 and 60. The sprocket wheel 60 is driven to move the chains 58 in the same direction as, but at a speed greater than, that of the belt 41, the chains 58 passing either side of the belt 42 (as viewed in plan, see Figure 2). The bars 56 are thus moved above the upper run of the belt 41, and through the passage between the latter and the lower run of the belt 23, at a speed greater than that of the belt 41 but less than that of the belt 23, the ratios of the speeds of the belt 23, the bars 56, and the belt 41 being respectively approximately 7:6:5 in the present arrangement.

The spacing of successive bars 56 is such that a group of components delivered from two successive flutes of the drum 49 is received between two successive bars 56. On account of the greater speed of the bars 56 relative to the belt 41, the components in a group are pushed along the belt 41 by a bar

56 so that the components are moved into axial alignment against the bar (as can best be seen in Figure 2), the leading cigarette length C in the group being moved rearwardly relatively to the other components, and a spring element 61 (Figure 1), which extends across the width of the belt 41, being provided to offer frictional resistance and to correctly align the components against the bar.

The groups of aligned components, supported by the belt 41 and pushed by the bars 56, travel between converging guide fingers 62 (Figure 2), arranged at either side of the plate member 45, which engage the outer ends of the cigarette lengths C and act to move the components in a group into endwise abutment.

The groups of axially aligned, endwise abutted components, are then fed sideways in succession to the passage formed between the belts 23 and 41, supported on the slower moving, 41, of the two belts. The groups of components are fed in timed relationship with the feed of the cork lengths L (which hereinafter will be referred to as "uniting bands"), so that as a group is pushed into the passage by its respective bar 56 it engages the leading end of a uniting band L carried on the belt 23. As can be seen in Figure 2, the width of the uniting bands L is slightly greater than the length of the double-length stubs S, and the relative positioning of the uniting bands and the groups is such that each uniting band can cover the stub S and overlap the ends of the cigarette lengths C of the group by which it is engaged.

On account of the difference in speeds of the belts 23 and 41, each group, being frictionally gripped between the belts, is caused to roll as it is moved sideways through the passage. Each group is rolled rearwardly relatively to the faster moving belt 23 (as considered in the direction of movement of the latter), and thus rolls over the uniting band L on the belt 23. The uniting band L readily adheres to the components in the group (the adhesive on the band being in an active state as previously described), and is wrapped around the group to unite the components as the group rolls. If desired, heaters 63, set in the member 44, may be provided to heat the latter, and thus to heat the uniting band and groups of components as they travel through the passage.

The rate at which the groups are caused to roll is dependent upon the difference in speeds of the two belts 23 and 41, whose speeds, as previously stated, are in the ratio 7:5. The speed at which the groups move sideways through the passage is substantially equal to the speed of the belt 41 plus half the difference in speeds of the belts 23 and 41; that is, the speed of sideways movement of the groups relative to the speed of the belts 41 and 23 is in the ratio 6:5:7 (the speed of the bars 56 relative to the speeds of the belts 23 and 41 being, as previously stated, also approximately 6:5:7).

In practice, the bars 56 move through the passage at a speed slightly less than the speed of sideways movement of the groups, so that, as a group is rolled, it moves slightly away from the following bar 56, the distance separating a rolling group and the following bar 56 being exaggerated in the drawings. Thus, it will be appreciated that by this arrangement the groups can be caused to roll at a relatively slow rate whilst they are fed sideways at a high speed.

The length of the passage (that is the length of the lower run of the belt 23) is arranged, in relation to the difference in speeds of the two belts, so that each group completes slightly more than one revolution as it is rolled. The length of the uniting bands L is slightly greater than the circumference of the components, and each uniting band is thus wrapped around its respective group so that the ends of the band overlap slightly.

The bars 56 move through the passage at the same speed as, and behind their respective groups, and act to push the assemblies formed by uniting the components in the groups from the passage over a bridge 64. The assemblies are received from the bridge 64 in flutes 65 provided in radial arms 66 of rotating wheels 67 mounted on the same shaft as the sprocket wheel 60, the bars 56 passing between successive arms 66. A rotating disc knife 68, acting between arcuate guides 69, severs each assembly centrally through the double-length stub S to produce two mouthpiece cigarettes. The mouthpiece cigarettes are then stripped from the wheels 67 by means of guides 70, which guide the cigarettes onto a moving catcher band 71 on which they form two rows.

WHAT WE CLAIM IS:—

1. A method of making mouthpiece cigarettes, comprising the steps of moving a group of components, including a stub and at least one cigarette length, arranged end to end in axial alignment, sideways through a passage formed between two opposed surfaces arranged to move in the same direction at different speeds, so that the group is moved sideways through the passage in the direction of movement of the said surfaces, and is caused to roll rearwardly relatively to the faster moving of the said surfaces (as considered in the direction of movement of the surfaces) during such sideways movement, and introducing a uniting band into the said passage so that the said band is wrapped around the group to unite the said components as the group is rolled.

2. A method as claimed in Claim 1, wherein successive groups, each consisting of a double-length stub positioned between and in endwise abutment and axial alignment with two cigarette lengths, is moved sideways through the said passage, uniting bands being introduced

into the passage so that a band is wrapped around each group as the group is rolled, and each united assemblage so formed is then severed through the centre of the double-length stub to produce two mouthpiece cigarettes.

3. Apparatus for making mouthpiece cigarettes, comprising a passage formed between two opposed surfaces arranged to move in the same direction at different speeds, means to feed groups of components, each group including a stub and at least one cigarette length, arranged end to end in axial alignment, to the said passage, so that each group is moved sideways through the passage in the direction of movement of the said surfaces, and is caused to roll rearwardly relatively to the faster moving of the said surfaces (as considered in the direction of movement of the surfaces) during such sideways movement, and means to introduce uniting bands into the said passage in timed relationship with the feed of the said groups so that a band is wrapped around each group to unite the said components as the group is rolled.

4. Apparatus as claimed in Claim 3, wherein the said opposed surfaces are surfaces of continuously movable, endless elements, such as belts, and the said groups of components are carried sideways by one of the said elements into the passage, and supported by the said one element as they are moved sideways through the passage.

5. Apparatus as claimed in Claim 4, wherein the said one element on which the groups of components are carried through the passage is the slower moving of the two elements, so that each group is rolled forwardly over the said one element (as considered in the direction of movement of the element).

6. Apparatus as claimed in Claim 4 or Claim 5, wherein there are provided movable members, such as bars, against which the said components can be aligned in their respective groups on the said one element as they are fed to the said passage.

7. Apparatus as claimed in Claim 6, wherein the said members are arranged to move continuously at a speed substantially equal to the speed at which the groups move sideways through the passage, a member acting to push a group of components into the said passage, to move through the passage behind the said group of components (as considered in the direction of sideways movement of the group) as the latter is rolled, and to push the group of united components from the passage.

8. Apparatus as claimed in any of Claims 4—7, wherein the uniting bands are severed from a web of suitable material, such as cork, and are introduced into the said passage by one of the continuously movable elements.

9. Apparatus as claimed in Claim 8, wherein the uniting bands are fed in succession by the faster moving of the said elements, so that each group of components is rolled rearwardly relatively to the said element (as considered in its direction of movement) and over a uniting band, which adheres to and becomes wrapped around the group.

10. A method of making mouthpiece cigarettes, substantially as described herein with reference to the accompanying drawings.

11. Apparatus for making mouthpiece cigarettes, constructed, arranged and adapted to operate substantially as described herein with reference to the accompanying drawings.

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Lt. Mitteilung des "Patent Office" vom 15.11.1966
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(as considered in the
movement of the group)
and to push the group
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1,046,489 COMPLETE SPECIFICATION
2 SHEETS
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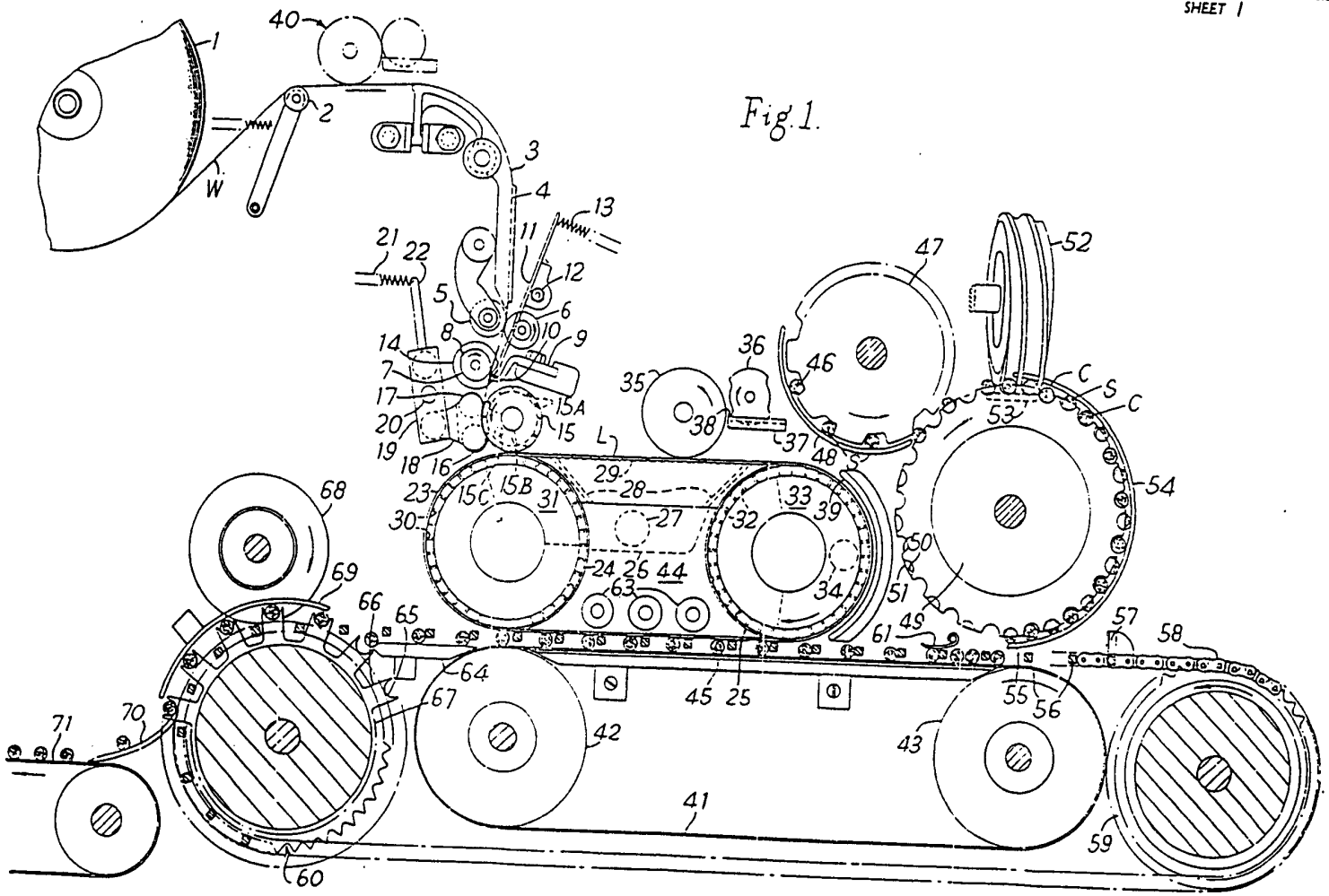
SHEET 1

Fig 1.



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SHEET 2

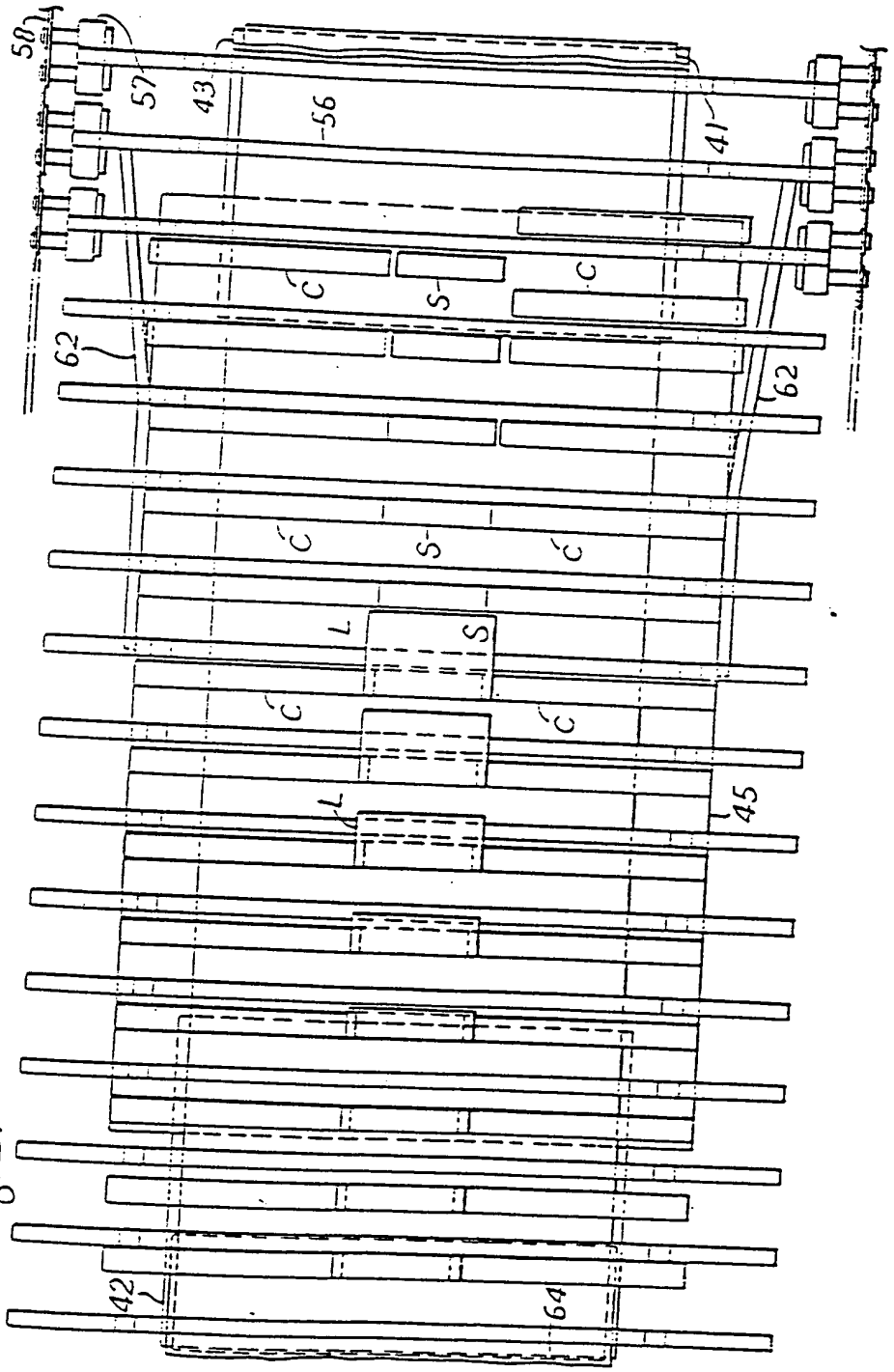

Fig. 2.